

MANNED SPACEFLIGHT IN THE NINETIES - THE EUROPEAN PERSPECTIVE

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Translation of "Die Bemannte Raumfahrt in den Neunziger Jahren - Eine europaeische Perspektive," Presented at the international symposium "Towards Columbus and Space Station," October 2, 1985, Bad Godesberg West-Germany, pp. 1-9.

(NASA-TM-77697)	MANNED SPACEFLIGHT IN THE	N86-21561
	NINETIES: THE EUROPEAN PERSPECTIVE	
(National Aeronautics and Space		
Administration)	11 p HC A02/MF A01 CSCL 22A	Unclas
		G3/12 05708

STANDARD TITLE PAGE

1. Report No. NASA TM 77697	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Manned Spaceflight in the Nineties- The European Perspective		5. Report Date January 1986	6. Performing Organization Code
		8. Performing Organization Report No.	10. Work Unit No.
7. Author(s) W. Finke		11. Contract or Grant No. NASW-4005	
		12. Type of Report and Period Covered Translation	
9. Performing Organization Name and Address Leo Kanner Associates P.O. Box 5187 Redwood City, CA 94063		14. Sponsoring Agency Code	
12. Sponsoring Agency Name and Address National Aeronautics and Space Admin. Washington, D.C. 20546			
15. Supplementary Notes Translation of "Die Bemannte Raumfahrt in den Neunziger Jahren - Eine europäische Perspektive," Presented at the international symposium "Towards Columbus and Space Station," October 2, 1985, Bad Godesberg West Germany, pp. 1-9.			
16. Abstract Inaugural speech for the international symposium describing why Europe must take an active part in all aspects of manned space travel for the nineties including the development of the space station itself and the development of its own reusable space transport and supporting ground equipment to proceed on an equal share basis with the US and Japan maintaining a close international cooperation.			
17. Key Words (Selected by Author(s))		18. Distribution Statement Unclassified - Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 11	22.

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Speech of Dr. Wolfgang Finke, Federal German Ministry for Research and Technology at the inauguatration of the international symposium "Towards Columbus and Space Station," on October 2, 1985, Bonn-Bad Godesberg.

Europe's entrance in manned space travels dates back to the European 1971 "Package Deal." Therefore it happened 10 years after the first short space flights of Yuri Gagarin and Alan Shepard. Another 12 years were to pass until Ulf Merbold was able to experience his own spaceflight as the first west European in the spacelab built by the European Space Organization ESA. In four week's time another group of European astronauts will be launched from the Kennedy Space Center for the D-1 mission. The preparations for the D-2 mission, presumably at the end of 1988 are started, although final decisions about it are still pending. Parallely to this the preparatory activities for Columbus, the European contribution to the American space station have begun. If all takes place according to the present plan, this permanently manned station will start operating in the first half of the nineties. The era of manned spaceflight has obviously also started for Europe.

It is perhaps, however, not too late to pose basic questions in this connection:

First: Must we really enter this era and really adopt this route?

Secondly: If we do so, what goals should we pursue and what should be our objectives?

Thirdly: What are the stages and the means which would lead us to these goals?

The first question has been occupying the interested public for some time now. It was the object of controversial debates and warning comments. But the decision of the German Cabinet of the middle of January and the unanimous resolutions of the ESA Council meeting at the minister level at the end of January this year have

given at least a preliminary "yes" to this first question about the European engagement in manned spaceflights. The reasons for this were both under the aspect of research and technological policy and of external and general political nature. Spaceflight /2* experience of more than two decades has shown that there are essentially four areas, for which man's advance beyond the narrowest confines of the earth, offer new chances not accessible by other means:

First of all the area of space science, that is the systematic research of the universe, its contents and its internal processes;

Secondly the exploration of the earth as a whole to extend our knowledge, but also to monitor the processes taking place, whether they be of natural origins or caused or influenced by man;

Thirdly the exploration and possibly also the use of weightlessness, which is achieved almost perfectly in the artificial earth satellites by the equilibrium of gravity and centrifugal force; and finally

Fourthly, the use of satellites preferably on geosynchronous orbits as relay stations for telecommunications and radio transmitters,, but also as navigation aids.

In the next few decades we may add to these four areas the use of the space near the earth for stationary weapon systems. I am not going to discuss this here.

For at least three of the four areas mentioned so far man did not play any role, or at least any indispensable role in space. The extraordinary growth of our knowledge of the universe by means of research satellites and space probes has been obtained by means of instruments operating automatically or controlled from the earth, and perhaps man's physical presence was not absolutely necessary to explore the moon. Meteorological satellites operate in the same way by remote control and automatically, also military reconnaissance and civil observation satellites. The same applies for navigation, telecommunications and radio satellites. Against this it could be argued, and not unreasonably, that in all these cases the permanent presence of crews is not only superfluous and costly, but also can
*Numbers in margins indicate pagination in foreign text.

be harmful for the accomplishment of the mission.

Thus at a first glance it seems that the only exception is /3 for the exploration of weightlessness. Even here the objection will be raised that the orbiting of the crews always disturbs the freedom of acceleration and has an adverse effect on the quality of the experiments, but at least the experimenters themselves are very decidedly of the opinion that in any case in the present state of affairs the presence of the crew is useful for them and in some cases indispensable.

Finally man can naturally not be replaced in space wherever he is the object of research in conditions of outer space. And he is such a research object not exclusively or even only mainly because he is a crew member of a spacecraft, but the objective of the experiments on man in space are predominantly to learn more about him and certain of his organs in general by this means.

Meanwhile it was found naturally that man in outer space can be very useful even outside the area of experiments on weightlessness, for example to repair satellites, to make jammed film cassettes work again or to bridge over failing lines. This is leaving aside the fact that maintenance operations in the orbit are more cost effective than other methods and that crew members of spacecraft can tackle much better unforeseen developments than the most intelligent robot. The collaboration of man also seems to promise considerable advantages for the assembly of large structures in orbit.

For this and perhaps also other reasons the Soviet Union and United States have started large scale and costly programs for the development and further extension of permanently manned space stations. The nature of such stations is such that they can not only remain over the territories of these two countries. They will always orbit over the entire globe and thus demonstrate before the whole world their visible and literally superior presence. If such a presence were limited to these two countries, this would mean specifically on one hand that only they had the means of covering these costs, but on the other hand also that only they have the chances to derive any benefits. It would also mean that a new and impressive distinguishing characteristic would exist between the

super powers and other powers. But such a development can be difficult for a policy line whose purpose is not to increase but to decrease tensions.

Therefore Europe rightly welcomed the fact that President Reagan's decision to develop a permanently manned space station was associated with his invitation to the friends and allies of the United States to take part with their own contributions in this development. The ESA Council decided in Rome to accept this invitation and to implement the Columbus Program. /4

This decision needs further confirmation after the end of the preparatory phase. We can expect surely this confirmation if on one hand the technical developments take place in promising manner, on the other hand the political negotiations between the United States and the European countries taking part in the Columbus program should lead to satisfactory agreements. For the moment there is nothing against these two expectations being satisfied. This would make of the European agreement to manned spaceflight which is for the moment short-term and to some extent experimental, a long-term binding commitment.

Assuming that this confirmation of Europe's intention to participate really takes place, expected within the next two years, the second questions arises: What are individually our concrete goals?

It is obvious that Europe must pursue a double goal with its participation in the development and later the operation of the space station, specifically:

-to improve through its own identifiable technical contribution its own technical capabilities and to prove them also in the operation, and on the other hand to continue to derive their benefit for its scientific as well as practical purposes in the possibilities offered by the space station with rights equal to those of the other participants.

The spacestation with the elements belonging to it in orbit is naturally only part of the overall system. Another part is the ground infrastructure required for its operation and for its use. In the third place the overall system includes the means of transport and communications for the connection between ground and orbit. It

is my understanding of the definition of participation that it /5
should not remain limited to the partial system of orbital structures,
but must also include the ground segment and the availability of
our own European transport and communication services at least in
principle.

The formula "in principle" is used intentionally here. The
scarcity of the resources available to us will not allow us to provide
our own adequate contributions in all three sectors from the beginning
and completely. In the long run this must however be possible and
therefore be secured also from the beginning as a possibility.

The decision in Rome provides also for the implementation of
the Columbus program the development of a more powerful European
carrier rocket. This Ariane 5 is no longer, as its predecessors
mainly designed to operate the transfer orbit to the geosynchronous
orbit, but should offer also favorable possibilities of transport
into an orbit near the earth. According to the present French
conceptions one of its payloads will be the orbital glider Hermes.
France has announced it and the European Research Ministers came to
know in Rome that Hermes will be offered for implementation within
the framework of the ESA. If this happens, Europe in the next decade
would be able to convey into orbit and also bring back from the orbit
to the earth not only material, but also crews. Besides NASA's
proven space shuttles, they would also be available, thus a second
type of reusable manned space transport system.

But to operate space stations the question does not only
arise of being able to reach them and leave them again. The
most permanent possible communication with them is no less important.
It can be secured by ordinary means through the earth's radio stations,
but this requires a chain of such radio stations around the entire
globe and their connection with each other. In many respects the
problem can be solved more favorably by the intermediate installation
of relay satellites. A beginning has already been achieved with
TDRS system. It goes without saying that this development will
continue and that Europe will also take part in it.

For the rest the idea that later each one will have his own /6
data relay satellite system seems less satisfactory. It is precisely
in the satellite supported communication technology that already today

there convincing examples of a working international cooperation. Another could be added for data relay satellites, say by the fact that within the framework of a single system the United States, Japan and Europe would assume one-third each. Each group could supply for this purpose its own satellite and its own ground segment. The common benefit would be to everyone's advantage.

The third partial system remaining is the ground segment. Here it is convenient to distinguish between the parts of the ground equipment, which refers to means of transport, those which secure technically the communications and those which concern the actual operation of the space station. For transport and communications the details of the corresponding ground segment are obtained from the system solutions chosen each time. Such a relationship for the operation of the space station is not equally compulsory. Rather very different solutions can be thought of here.

For Europe I consider two boundary conditions as important: on one hand the solutions selected must secure an effective right to share in decisions for the operation of the entire system to preserve European interests, on the other hand it must secure at least for its own system component both the scientific, technical and also commercial benefits in a manner limited only by safety requirements. The D-1 mission lying before us, in which the control of the shuttle flight takes place from mission, but the control of the spacelab operation devolves on the German Space Center in Oberpfaffenhofen, and also the entire preparation of the payload and later evaluation of the results is in our hands, shows the direction in which we must also seek a solution for the first space station.

It may be still too early today to make a final decision individually. We are still right at the beginning especially with regard to research and use of weightlessness. But the results obtained so far encourage the increased continuation of such experiments. In some cases concrete technical possibilities of use are obtained. The commercial interests are increasing and led meanwhile to the first founding of companies, fortunately also in Europe. The organization of the ground segment of future

space station systems must also be taken into consideration from the beginning. The experience from the spacelab missions will provide further elements for the final solution.

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What therefore are the stages which are needed in this situation for preparing for manned space travel in the nineties from the European perspective? The answer to this is simple in its content. Its difficulty will consist in the fact that it must be implemented actually and decidedly.

An important first step is the efficient implementation of the European Columbus and Ariane 5 programs. In both cases the question will be both to keep within their time and cost schedules. A powerful project organization is an indispensable prerequisite for this. Moreover the negotiations taking place currently with the United States should be completed as far as possible satisfactorily within the year.

Secondly the preparation must be made for further European decisions in the communication and transport sector so that at least by the end of the nineties the European participation on equal basis in a worldwide data relay satellite system will be implemented and our own reusable European transport system be available for manned spaceflights. If an international data relay satellite system cannot be implemented or cannot be implemented under technical conditions, our own European solution would be preferable to any other for it as well as for the transport system.

Thirdly the possibilities available now or in the near future on research on weightlessness must be used to an increased extent. This applies for altitude research rockets such as Texus, for platforms such as Eureca and naturally also for Spacelab as well as other shuttle payloads. Moreover this includes the extension of the infrastructure on the ground, the establishment of astronaut crews, the building of user centers, the formation of research elements.

In the fourth place the research program and earth observation program must be checked primarily to see whether the goals pursued cannot be implemented better and more cheaply with systems which move in attainable orbits which can be maintained and repaired, and

in individual cases even totally or partly recoverable, rather than /8
the disposable instruments now being used. NASA's space telescope,
in which the European industry and European science have also par-
ticipated and which will be brought into orbit next year, is an
example of this new trend. Europe should not remain closed in
itself, but should prepare already now to make itself available
from the beginning of the nineties for manned orbital stations,
which are particularly suitable on the whole for such maintenance
and repair missions: such operations are being considered for...
spacecraft, but also for platforms on polar orbits.

Finally, in the fifth place it should be studied whether
it is worthwhile to provide for the geosynchronous orbit the
assembly of large structures in low orbit and what the technical
consequences could be for the layout of these structures and
their payloads. Perhaps in this way it would be possible to
avoid in this way the feared lack of place on the geosynchronous
orbit, but also to increase considerably the economical
capability, reliability and life of the system. Moreover it will
be checked whether space stations could offer advantages as
basis for missions into interplanetary space.

The mere listing of these necessary and at least desirable
measures makes it clear that a European commitment in space travel
in the coming decades cannot be cheap. If therefore it is desired
(and my own opinion is that it should be so) more funds than
have been provided before will be needed in the future. It would
be an illusion to believe that in the next ten years other means
than taxes could cover the main portion of the cost. On the other
hand it is however unjustified to assume that during this period
no drastic increase in the commercial interest in the use of the possi-
bilities offered by outer space will arise. This would be
indeed absolutely indispensable for the final stabilization of the
entire commitment.

Space travel must and will of course also become much cheaper
during this time. The aura of exclusiveness which is connected with
it up to now will disappear and also the cost increasing effect /9
which is derived from it. Today among most participants it is
still clearly detectable whether we are dealing with international

or national organizations, the industrial sectors surviving mostly through their contracts or scientific institutions employed in this sector. But compared with the situation ten years ago, a clear trend towards greater normalcy cannot be disputed. It will continue and an increasing competition as well as the appearance of new participants will accelerate this process in the future to the regret of some, but for the benefit of the whole.

I should like to end with a last remark on the perspective of the nineties and make the trivial statement that the development in our sector too will not remain standing at the end of the period contemplated. Naturally it is difficult today to say anything more precise regarding the presumable course beyond the turn of the century. But one thing is sure: if the concept of manned space station is implemented in the nineties, it will be left to just one station in the western world. Diverging interests, incompatible requirements, technical limits, new developments, these and many other elements will lead to the fact that other stations will be contemplated. In this position Europe must also be prepared to go its own route. This would not mean the end of collaboration with the Americans and without our future East Asian partners, but should on the contrary place this collaboration on a more balanced and therefore more permanent basis. And this could provide a very clear impetus to the efforts of increasing the collaboration inside Europe. The decisions of Rome have smoothed the way in this direction. Now the problem is to really take this path.

The symposium beginning this evening should and will contribute to this and will provide us with an abundance of data as to where we stand today in the United States and in Europe on the way to manned space travel of the nineties. This will so I hope make us all a little smarter and also a little more certain about traveling forward step-by-step on this path. I would like to wish the symposium a satisfactory course and the participants a couple of good and informative days with us here in Bonn-Bad Godesberg,